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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/529,891

07/26/2005

Takako Yamaguchi

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FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER

JELSMA, JONATHAN G

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

02/20/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/529,891	Applicant(s) YAMAGUCHI ET AL.	
	Examiner Jonathan Jelsma	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15 and 16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15 and 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/23/2008</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Summary

1. This is the second office action based on application 10/529,891 and in response to Applicant's Arguments/Remarks filed 12/23/2008.
2. Claims 1-14 are previously pending. Claims 1-4 have been canceled, claims 15-16 are new. Claims 15-16 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 15-16 are rejected under 35 U.S.C. 102(b) as being anticipated by ALKAISI ("Nanolithography in the Evanescent Near Field" Advanced Materials 2001, 13, No. 12-13, July 4).
5. ALKAISI teaches an exposure mask, and method of making the mask, for forming an image on a photoresist on a substrate (page 879, section 3). The mask with opaque regions is used in an exposure method, using UV illumination, from a source such as a laser (page 878, section 1 paragraph 2), utilizing the near field diffraction effects to create an image in the photoresist coated substrate beyond the diffraction limit of the projection lithographic system (page 879 section 3, and see figure 1). The

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exposure mask comprises opaque regions with gratings, such as dense or isolated lines (page 880 paragraphs 1-2). ALKAISI then teaches a simulation and model of the mask based on the pitch and thickness of the medium to be imaged in order to simulate and model the diffraction in the evanescent near field of the metallic gratings (page 883 section 6.1, paragraphs 1-2).

6. ALKAISI teaches an optical photoresist thickness of 60 nm (page 880 section 4 paragraph 1) where the photoresist is the layer where the image is to be produced, so $T = \text{appx } 60 \text{ nm}$. The line width (W) may then be produced by less than 50 nm (page 880 section 4 paragraph 2). Figure 5b then shows 280 nm period (P) with 70 nm apertures (D), forming a width of the light blocking member (K) being 210 nm (page 881 paragraph 1). Additionally the photoresist may go through further processing to give a uniform thickness of 45nm (T'') (page 882 section 5.2 paragraph 2 – page 883 paragraph 1). Therefore the value of $210\text{nm} > (50\text{nm} + 2*60\text{nm}) = 170\text{nm}$, and $70\text{nm} < (280\text{nm} - 50\text{nm} - 2*60\text{nm}) = 110\text{nm}$. Similarly $70\text{nm} = (280\text{nm} - 50\text{nm} - 2*60\text{nm}*(1 + \alpha)) = 110\text{nm}$, where $\alpha = 1/3$, and $(50\text{nm} + 2*60\text{nm}) < (280\text{nm} - 70\text{nm})$. Also $50\text{nm} < (280\text{nm} - 70\text{nm} - 2*45\text{nm})$.

7. ALKAISI teaches a simulation using electromagnetic technique to study the near-field region behind conducting gratings (page 883 section 6). Specifically, the electromagnetic fields are approximated by a set of functions, coefficients are determined for these basis functions based on the boundary conditions, then a full vector solution can be found at any point (page 883 section 6.1, paragraph 1). Specifically figure 11 shows the results of a contour plot (concentric circles) of the normalized electric field intensity.

Response to Arguments

8. Applicant's arguments, see page 6 paragraph 5 of Applicant's Arguments/Remarks, filed 12/29/2008, with respect to 35 U.S.C. 112, first paragraph rejection of claim 1 have been fully considered and are persuasive. The 35 U.S.C. 112, first paragraph rejection of claim 1 has been withdrawn. Claim 1 has been canceled rendering the rejection moot.

9. Applicant's arguments, see page 7 paragraph of Applicant's Arguments/Remarks, filed 12/29/2008, with respect to 35 U.S.C. 112, second paragraph rejection of claims 5 and 9 have been fully considered and are persuasive. The 35 U.S.C. 112, second paragraph rejection of claims 5 and 9 has been withdrawn. Claims 5 and 9 have been canceled rendering the rejections moot.

10. Applicant's arguments filed 12/23/2008 have been fully considered but they are not persuasive.

11. On page 10 of Applicant's Arguments/Remarks, Applicant argues that ALKAISI does not teach or suggest anything regarding the concentric circle approximation or the condition $D \leq P-W-2T$. This argument is not persuasive.

12. First examiner notes that the condition $D \leq P-W-2T$ must be satisfied in order to meet the claim limitations, the cited areas show that ALKAISI does in fact meet the limitation. Additionally while ALKAISI does not explicitly teach the concentric circle approximation, it does teach using electromagnetic technique to study the near field

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region behind conducting gratings (page 883 section 6). Further, ALKAISI teaches approximating the electromagnetic fields based on a set of Maxwell functions, determining the coefficients and then creating a vector solution to simulate the electromagnetic field at any point (page 883 section 6.1, paragraph 1). For instances Figure 11 shows a contour plot of the normalized electric field intensity, and for small values specifically from the chromium grating the model will match that of the concentric circle model. Therefore, the simulation model of ALKAISI does in fact teach a concentric circle approximation.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

14. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Jelsma whose telephone number is (571)270-5127. The examiner can normally be reached on Monday to Thursday 7:00 a.m. - 4:00 p.m.

16. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

17. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/
Supervisory Patent Examiner, Art Unit 1795

JGJ